



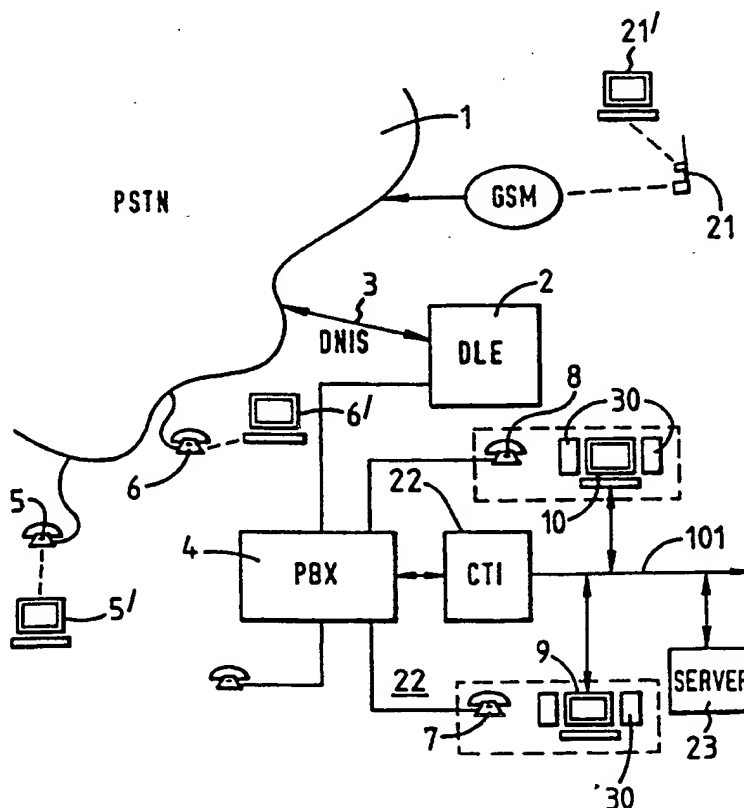
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(54) Title: COMPUTER TELEPHONY INTEGRATED NETWORK

(57) Abstract

The invention concerns an integrated computer and telephony system and a method of integrated computer telephony using at least one switch capable of receiving incoming telephone calls and of dialling outgoing calls; a computer terminal associated with the switch; memory means associated with the said computer terminal and adapted to store a plurality of phone numbers said switch including a plurality of virtual telephones each corresponding in use to an individual one of said associated numbers; means for recognising that a telephone number connected to the switch as an incoming call is associated with at least some of said plurality of numbers; and means for causing said switch to call each of said associated numbers in parallel.



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Computer Telephony Integrated Network

The present invention concerns systems which utilise
5 the combined capabilities of computers and telephony.

Historically computers and telephony have occupied
different areas in the overall field of technology with
the exception of the increasing use of computer
10 technology in controlling and managing telephone
networks. However there is now a rapid convergence in
these two areas so that the boundaries between computing
and telephony are becoming harder to define. Thus
computers, as well as being used to control telephones,
15 can have special telephone interfaces that carry out the
telephony functions; additionally information carried
over telephone lines can be detected by computers and
used to handle the calls more efficiently.

20 One of the forces driving the integration of
computing and telephony is that modern businesses have
a growing need to unite individuals in different
locations into project teams. Another concept uniting
computing and telephony is that of the "hot desk" where
25 an individual does not necessarily have a single defined
office location but may rather be migratory so that
his/her office is defined at the point of logging-in to

a computer terminal, a procedure which obviously can occur at widely spaced locations given the great increase in computer networks. Thus whilst the server of the computer network will know at log-on where the user is
5 located this is not necessarily so for the user's telephone number.

Thus the present invention is concerned with the situation in which members of a work group can easily
10 remain in touch independently of location, for example at multiple offices, at home and when mobile.

A system has evolved to meet these needs, which is known as Computer Telephony Integration (CTI). A set of
15 protocols and standards for CTI have also arisen and these standards are known as Standards ECMA-217 SERVICES FOR COMPUTER SUPPORTED TELECOMMUNICATIONS APPLICATIONS PHASE I, and Standards ECMA-218 SERVICES FOR COMPUTER SUPPORTED TELECOMMUNICATIONS APPLICATIONS PHASE II.

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In what follows it will be assumed that these standards are met by the specific embodiment to be described, but it will be appreciated that the inventive concept to be set out later does not necessarily demand
25 that the protocols of the above standards are followed.

One system involving CTI has been developed by

British Telecommunications Limited and is known as Distributed Office Technology (DOT). In a DOT network each telephone user has an associated terminal by means of which he/she can log into what can be referred to as a virtual work group. Once logged-on the user will be provided on the associated monitor with a visual indication of each member of the team. Both the telephony and physical status of each member of the virtual work group is thus displayed on the monitor, which can be the screen of a standard PC which acts as the terminal. Users may add and remove members from the work group at any time. This can be achieved by dragging and dropping a new individual from a directory onto the work group. When a user receives a phone call, not only does the telephone ring at the physical location but the user's icon will flash and a screen pop will appear. Every other member of the virtual work group who has logged in will be able to see that the particular member of the team has a call ringing. The user can analyse the screen pop, and answer or reject the call. The screen pop will at the very least give the number of the incoming call and, if available, the network database additional relevant information concerning the caller. However the fact that a system as just described has come into existence has been largely caused by the mobility of the members of the work group. An obvious result of such mobility is that an intended recipient of a call can

be at one of many locations, which can include being at home where there may be no computer terminal, or actually travelling and thus only contactable on a mobile phone.

5 In one aspect the present invention is concerned with solving this problem.

 In accordance with a first aspect of the present invention there is provided an integrated computer and
10 telephony system comprising:

 at least one main switch capable of receiving incoming telephone calls and of dialling outgoing calls;

 a computer terminal associated with the switch;

 memory means associated with said computer terminal
15 and adapted to store a plurality of phone numbers said switch including a plurality of virtual telephones each corresponding in use to an individual one of said associated numbers;

 means for recognising that a telephone number
20 connected to the switch as an incoming call is associated with at least some of said plurality of numbers; and

 means for causing said switch to call each of said associated numbers in parallel.

25 Preferably the system further comprises means for joining one of said associated numbers with the source of said incoming call when that number has been answered,

and of breaking connection to the remaining ones of said associated numbers which have not been answered.

In accordance with a second aspect of the present invention there is provided a method of telephony comprising receiving incoming telephone calls and dialling outgoing calls at at least one switch;

a computer terminal associated with the switch;

storing in memory a plurality of phone numbers with said switch including a plurality of virtual telephones each corresponding in use to an individual one of said associated numbers;

recognising that a telephone number connected to the switch as an incoming call is associated with at least some of said plurality of numbers; and

causing said switch to call each of said associated numbers in parallel.

The switch may comprise a PBX, or an Interactive Voice Unit or an automatic call distributor.

In a preferred embodiment the system comprises a plurality of computer terminals linked in a network and a plurality of phones each associated with a computer terminal; a group of users being defined for the terminals and telephones; and wherein when a user is

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logged into the network the monitor associated with that user is enabled to display the constituent members of the group together with the telephone status of the various members.

5

In order that the present invention may be more readily understood, an embodiment thereof will now be described by way of example and with reference to the accompanying drawings in which:

10

Figure 1 is a diagram showing the general telephony environment in which the present invention operates;

Figure 2 is a more detailed diagram showing a part
15 of a CTI network which incorporates the present invention;

Figure 3 is a diagram showing the flow of data between a CTI switch and a computer;

20

Figure 4 is a diagram of a telephony system for alerting computers without ringing an associated phone; and

25 Figure 5 is a diagram showing part of the flow of data in the system shown as Figure 4; and

Figure 6 is a diagram showing a second embodiment of the present invention; and

Referring now to Figure 1 of the accompanying drawings, 1 indicates the Public Switched Telephone Network (PSTN) and 2 a Digital Local Exchange (DLE) connected to the PSTN by appropriate links 3. A pair of PBX's 4 are shown, connected again by appropriate links to the DLE 2. Naturally the complete system will have many more DLE's and PBX's.

Figure 1 also shows individual telephones 5, 6 connected to the PBX's as well as telephones 7 and 8 which are associated with computer terminals 9, 10 which are in turn connected to a conventional network server which has not been shown. As shown by the dotted line 11, it is possible for the PBX's to intercommunicate without having to route data via the PSTN. In a typical configuration call delivery to one of the PBX's will be via ISDN (Integrated Services Digital Network) with Calling Line Identity (CLI) and Dialed Number Identification Service (DNIS). The PBX's can be Meridian Option 81 (RTM) PBX's which have been CTI enabled with a Meridian link (RTM) manufactured by Nortel.

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The servers from the computer side of the CTI network can be UNIX servers and the PC's general purpose

computers operating in a microsoft environment.

In Figure 1 the telephones 5 and 6 are assumed to be located in users' homes and the telephones 7 and 8 and their associated PC's 9 and 10 located in an office environment. The dotted boxes surrounding telephone 7 and PC9 and telephone 8 and PC10 indicate that the telephones and the PC in each box are associated. This is of course purely by way of illustration. Whilst the main links to the DLE and the PBX's will be digital, the home links can be analog. In the system shown in Figure 1 it is not possible for an incoming call to cause each of the telephones shown to ring simultaneously.

Referring now to Figure 2 of the accompanying drawings, integers in this figure which are common to Figure 1 have been given the same reference numerals. Figure 2 additionally shows a GSM 20 linked to the PSTN 1 and to a mobile phone 21.

20

In this figure it is assumed that the telephones 6 and 7 are linked into a CTI network with the enabling link shown at 22, and a UNIX server is indicated at 23. Figure 2 also shows at 24 a set of "virtual" or "dummy" telephones. The necessity for this will become apparent from the description of Figure 3, which shows the flow of data transfer between the CTI-enabled PBX of Figure

2 and a computer. The system shown in Figure 2 enables an incoming call from the PSTN to cause simultaneous ringing on a selected plurality of phones so that a user can potentially be accessed at any one of a plurality of
5 different locations, including a mobile phone. If one of the phones is answered then a connection is made between the incoming call and the answered phone and the other phones are disconnected.

10 The transfer of data between the CTI-enabled PBX and the computer will now be described with regard to Figure 3 of the drawings.

In Figure 3 the CTI-enabled PBX of Figure 2 has been
15 replaced by a general switch indicated at 25. This is because the functions to be described can be carried out by different types of hardware. Thus switch 25 could be an Interactive Voice Unit (IVU) or a PBX/ACD, that is an automatic call distributor.

20

The interaction between the switch 25 and the computer is as follows:

at 100 the switch 25 responds to an incoming call
25 DNIS (Figure 2) from the PSTN and generates a route request for the received call. This call is labelled CID1. CID means Call ID and is a unique handle for that

10

call, with the number indicating that it is the first call in this particular sequence.

In response to the route request (CID1) the computer
5 10 at 101 returns to the switch a Route Select Signal which effectively ensures that the calling party receives a ringing tone. At 102 the computer refers to its database, stored for example in the server hard discs, and asks to be given a list of numbers. This list
10 corresponds to potential locations for the intended recipient of the call and is indicated at 40. The list of numbers are returned from the server database to the computer at 103, and at 104 the computer transfers the numbers (#2, #3, #4....#N) to the switch 25. Whilst the
15 computer is accessing the numbers list the incoming call is held in the switch, as shown at 50 in Figure 2. Once the list of numbers has been received from the computer the switch responds by dialling, in parallel, the numbers on the list. It is for this reason that the dummy
20 telephones shown at 24 are required, as it is necessary for the PSTN to believe that each of the numbers has an independent origin. When one of the dialled numbers is accepted the switch informs the computer at 105 that an answer has been received. As shown in Figure 3, it is
25 the second number of the list, namely #3, which has been answered. The computer replies at 106 asking the switch to join #1 to #3 completing the call. At the same time,

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at 107, the computer, using the simplest scenario, disconnects the unanswered numbers. As alternatives to the simple disconnection of the unanswered numbers, the recipient of the call could be given the option to
5 maintain the ringing of the other numbers so as to initiate a conference call once one or more of them have answered.

As the embodiment being described can be implemented
10 in a CTI system such as the DOT system described hereinbefore, it will be appreciated that with the multiple call delivery system just described and where the call is delivered to one or more telephones associated with computer terminals, then it will be
15 possible for any person at a terminal corresponding to a phone which has been rung by the multiple call delivery system to inspect the identity of the caller within the limits defined by the system and, if necessary, intercept the call.

20

Referring now to Figure 4 of the drawings integers in this figure which are common to Figures 1 and 2 have been given the same reference numerals.

25 In this embodiment the system is arranged so that an incoming call from the PSTN can cause a display on the monitor of a terminal associated with the incoming call

without the necessity of the telephone itself ringing. Thus the incoming call is in effect held whilst the presence of the incoming call is indicated at the computer terminal. An additional feature is that when
5 the receipt of an incoming call has been displayed in this manner, the computer network can also inform other members of the network of the fact that a call has been received.

10 In Figure 4 it will be seen that each office-based computer terminal besides having an associated monitor also has a pair of loudspeakers. 30. The other, including the lap top, computers can have a sound card and some form of loudspeaker. Because of this when an incoming
15 call has been detected the computer terminals can generate a ringing tone similar to the ringing of a telephone though it is likely to be advantageous if it is differentiated from the ringing tone of the telephone immediately associated with it and also if it is
20 distinguished from the pseudo-ringing tone of other computer terminals. As a feature each computer and its sound card may be arranged so as to emit a particular ringing tone which also distinguishes it from other computers when they are alerting their users of an
25 incoming call. Additionally when an incoming call is received at the PBX this is displayed at each terminal which has logged on provided that the logged on terminals

have indicated that they are interested in calls to that number. As the identity of the incoming caller is displayed at each of the appropriate logged on terminals users at each of these terminals can make an informed
5 decision as to whether or not they wish to intercept the call even if it was not initially intended for them.

The transfer of data between the CTI-enabled PBX and the computer to enable the above will now be described
10 with regard to Figure 3 of the drawings.

In Figure 5 the CTI-enabled PBX of Figure 4 has been replaced by a general switch indicated at 25. This is because the functions to be described can be carried out
15 by different types of hardware. Thus switch 25 could be an Interactive Voice Unit (IVU) or a PBX/ACD, that is an automatic call distributor. In fact, the actual configuration of switch 25 is not an essential factor in carrying out the present invention. This will be
20 expanded upon hereinafter.

The interaction between the switch 25 and the computer is as follows:

25 at 100 the switch 25 responds to an incoming call DNIS (Figure 2) from the PSTN and generates a route request for the received call. This call is labelled

CID1. CID means Call ID and is a unique handle for that call, with the number indicating that it is the first call in this particular sequence.

5 In response to the route request (CID1) the computer
10 at 101 returns to the switch a Route Select Signal
 which effectively ensures that the calling party receives
 a ringing tone. At 102 the computer refers to its
 database 200, stored for example in the server hard
15 discs, and asks to be given a list of numbers. This list
 corresponds to locations of computer terminals for the
 various users which make up a virtual work group. The
 list of numbers is shown at 200 and contains the internet
 protocol numbers (IP) of the other members of the work
20 group. The list of numbers are returned from the server
 database to the computer at 103, and at 104 the computer
 accesses the terminals corresponding to the received list
 of numbers on the computer network, this network being
 indicated at 201. It will be appreciated that there is
25 a wide choice available of the terminals to be accessed
 in response to an incoming call. Thus it is possible for
 a user to define on an individual basis those terminals
 that he wishes to be accessed when his/her phone is rung
 by an incoming call. It is also possible for the source
 of an incoming call to be identified by its call identity
 so as automatically to access a stored list of numbers.
 At each of the terminals accessed in this way an

indication of an incoming call can be given by the computer using its sound card and associated loudspeakers to generate a pseudo ringing tone. As already mentioned, each computer can generate a pseudo ringing tone which is differentiated from its neighbours. The alerted users at the accessed terminals can then make a decision whether or not they wish to intercept the call, with data concerning the incoming call being supplied by a suitable screen pop and/or by the audible indication which can, as will be described, be voice synthesis. If the initial recipient decides to take the incoming call this is indicated at 106 in Figure 5. The data sent at 106 to the switch will be a route select signal such that the presence of the incoming call held at the switch will cause the selected telephone number to ring. Of course the computer terminal will already have alerted the user of that phone that a call will be coming. If one of the users of the other alerted terminals decides to intercept the call this can be done in a variety of manners. Thus a user can use a simple manual input via a key or a pointer device such as a mouse to indicate his/her interest in the call. Alternatively, the terminal could include voice recognition and respond to a voiced command. In this context it is possible for the computer, as well as generating a ringing tone, and perhaps a screen pop, to use voice synthesis to announce the arrival of the incoming call, for whom the call was

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initially intended, and the identity of the calling party. It is possible that no member of the virtual work group is present or wishes to intercept the call to which they have been alerted via their computer terminals. In
5 such a case the system may include the possibility of diverting the incoming call to a voice mail facility.

In the system just described the flexibility allowed by the presence of the computer terminal can be utilised
10 to provide further advantageous features. Thus the computer can be configured so as to respond in a variety of different ways on receipt of an incoming call from a source. In addition to providing a display giving information with regard to the source of the incoming
15 call and also of giving a ring which is distinctive with respect either to a normal telephone call or to a computer-type alert, the computer can be programmed to give a variety of rings which can be used to indicate either the source of the incoming call or the fact that
20 a particular member of the group has been rung so that the user can decide whether or not to intercept the call. Thus the computer terminal can give an indication not only of the source of the call but its intended recipient on another telephone number.

25

If the sound generating abilities of the computer include voice synthesis then the facility of indicating

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the source of an incoming call or the member of the group being rung can be achieved by appropriately programmed voice announcements and there again can be specified individually for each terminal.

5

Thus a wide range of options are provided in the system described to specify the manner in which each computer terminal gives an alert indication that an incoming call has been received at a number in the
10 group.

It will be appreciated that although the term group has been used in the specification this term does not imply a single fixed group. Basically for any one user
15 the group encompasses those numbers in which the user is interested. Thus the make up of a group can vary from user to user either under the user's own choice or as decided by some other person.

20 To give a simple example if there are four telephone numbers in the stored list the system can generate a different ringing tone for each number with each terminal using the same set of four ringing tones. Thus when the terminal of the intended recipient of an incoming call
25 is logged in and is alerted he/she will hear the ringing tone associated with that terminal and the other terminals within the group, which will also have been

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alerted, will give the same ringing tone and thus indicate to their users that somebody is trying to access a member of the group though not that specific terminal.

5 It is of course possible for each computer terminal to be individually configured so as to give confirmed alert indications which although specific to that terminal nevertheless differentiate between the various members of the group.

10

 Another feature is that whilst a member of the group has not logged his/her terminal into the system, the terminal of those members of the group which have logged in will nevertheless give to their users indication that
15 the incoming call has been received at the switch.

 It will thus be appreciated that the system described has a number of advantages.

 A user can immediately identify an incoming call
20 without actually answering it. Additionally when the members of the group are rung a user can be made aware of both the source and the destination of the incoming call and make a decision whether or not to intercept the call. The indication of an incoming call can be made in
25 a number of different ways which can be individually tailored for each individual. The user can also be informed with regard to calls to other members of the

group and can take appropriate action.

It will also be possible to combine the ringing in parallel of telephones within a group as described with regard to Figures 2 and 3 with providing non-telephone ringing indications as described with regard to Figures 4 and 5 at computer terminals associated with other telephones within the group.

10 In a simple example a member of the group might have three or four phone numbers associated with him. These could be a home number, an office number, a mobile number and a hotel number.

15 Thus the system just described with receipt of an incoming call, ring all four numbers. However, other members of the group also are logged in may wish to monitor incoming calls but not wish to have their phones ring by a call intended for this particular number unless
20 they specifically wish to intercept the call. In such a case the system configuration shown in Figure 6 can be used.

In Figure 6 integers which are common to Figure 2
25 and 4 have the same reference numerals and will not be described again.

20

In this Figure 6 additional telephones 12, 13 and 14 are shown each with a respective associated computer 15, 16 and 17, the computers having loudspeakers 30.

5 The configuration of the telephones 7, 8, 12, 13 and 14 and their associated computers can be set by their users so that either of the procedures described with regard to Figures 2 and 4 can be carried out. Thus one user can specify multiple ringing as described with
10 regard to Figure 2 and 3. For example, the user could specify telephones 6, 7 and 21. The remaining terminals 15, 16 and 17 can be set so as to provide alert indications as already described. Thus an incoming call to the first user will cause simultaneous ringing on his
15 specified phones, the other in the group will receive computer based alerts as already described.

Thus in effect the flow diagram of Figures 3 and 5 will be combined.

20

Thus as an example if an incoming call arrives at the PBX, the system will from the list of numbers stored at 200 return both the numbers to be rung in parallel and the terminals if they have been logged in, to be alerted.
25 This is shown at 103 in Figure 3.

If a ringing phone is answered then step 105 of

Figure 5 follows, whilst if a user at a computer terminal decides to intercept the call step 106 of Figure 5 is carried out.

5 The preceding description has been directed to various specific types of switches such as are currently used in telephony. There is an increasing trend to utilise switching techniques which are purely computer based or which are based on computers associated with
10 telephone cards. The exact nature of the switching system has no real relevance to the basic inventive concept of supplying in parallel multiple calls in response to a single incoming call. Thus the switch associated with the computer could also be a network
15 switch, such as a public telephone exchange, or any switch operated by a third party operator or a telephony company.

CLAIMS

1. An integrated computer and telephony system comprising:

5 at least one switch capable of receiving incoming telephone calls and of dialling outgoing calls;

a computer terminal associated with the switch;

memory means associated with said computer terminal and adapted to store a plurality of phone numbers said
10 switch including a plurality of virtual telephones each corresponding in use to an individual one of said associated numbers;

means for recognising that a telephone number connected to the switch as an incoming call is associated
15 with at least some of said plurality of numbers; and

means for causing said switch to call each of said associated numbers in parallel.

2. A system as claimed in claim 1, and further
20 comprising means for joining one of said associated numbers with the source of said incoming call when that number has been answered, and of breaking connection to the remaining ones of said associated numbers which have not been answered.

25

3. A system as claimed in either of the preceding claims, wherein said switch comprises a PBX, or an

Interactive Voice Unit or an automatic call distributor.

4. A system as claimed in any one of the preceding claims, wherein there are a plurality of computer
5 terminals linked in a network and a plurality of phones each associated with a computer terminal; wherein a group of users is defined for the terminals and telephones; and wherein when a user is logged into the network the monitor associated with that user is enabled to display
10 the constituent members of the group together with the telephone status of the various members.

5. A system according to claim 4, wherein when a plurality of numbers have been rung in parallel, a call
15 identity is displayed on those computer terminals associated with dialled telephones.

6. A system as claimed in claim 5, and whereby each of said selected computer terminals is adapted, in response
20 to the accessing of said list, by the recognition of an incoming call being one of said plurality of numbers to give an indication that an incoming call has been received to the computer terminals not directly associated with the incoming call, the indication
25 identifying the intended recipient of the incoming call.

7. A system as claimed in claim 6 wherein at least one

computer terminal has an associated loudspeaker and is capable of emitting an audible indication that an incoming call has been received.

- 5 8. A system as claimed in claim 7, wherein the audible indication from the or each computer terminal is audibly differentiated from any other computer terminal.

- 10 9. A system as claimed in claim 8 wherein when an audible indication is given at a computer terminal not directly associated with the incoming call the audible indication is one which is individual to the intended recipient of the incoming call.

- 15 10. A system according to any preceding claim, including means for generating a screen pop at the screen of each terminal accessed in response to the receipt of an incoming call.

- 20 11. A system as claimed in claim 9 or claim 10 wherein each computer terminal can be independently programmed to provide audible indications of telephone numbers which are individual to that computer terminal.

- 25 12. A system according to claim 5 or any one of claims 6 to 11 when dependent on claim 5 wherein at least some of the computer terminals are responsive to vocal

commands.

13. A system according to any one of claims 5 to 12 wherein at least one of the computer terminals is capable
5 of voice synthesis and is capable of providing call identification in this manner.

14. A method of integrated computer and telephony:
receiving incoming telephone calls and dialling
10 outgoing calls at at least one switch;
storing in memory a plurality of phone numbers with said switch including a plurality of virtual telephones each corresponding in use to an individual one of said associated numbers;
15 recognising that a telephone number connected to the switch as an incoming call is associated with at least some of said plurality of numbers; and
causing said switch to call each of said associated numbers in parallel.

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15. A method as claimed in claim 14, and further joining one of said associated numbers with the source of said incoming call when that number has been answered, and of breaking connection to the remaining ones of said
25 associated numbers which have not been answered.

16. A method as claimed in either of claims 14 or 15,

wherein said switch comprises a PBX, or an Interactive Voice Unit or an automatic call distributor.

17. A method as claimed in any one of claims 14 to 16,
5 wherein there are a plurality of computer terminals linked in a network and a plurality of phones each associated with a computer terminal; wherein a group of users is defined for the terminals and telephones; and wherein when a user is logged into the network the
10 monitor associated with that user displays the constituent members of the group together with the telephone status of the various members.

18. A method according to claim 17, wherein when a
15 plurality of numbers have been rung in parallel, a call identity is displayed on those computer terminals associated with dialled telephones.

19. A method as claimed in claim 18, and whereby each
20 of said selected computer terminals is adapted, in response to the accessing of said list, by the recognition of an incoming call being one of said plurality of numbers to give an indication that an incoming call has been received to the computer terminals
25 not directly associated with the incoming call, the indication identifying the intended recipient of the incoming call.

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20. A method as claimed in claim 19, wherein at least one computer terminal has an associated loudspeaker and is capable of emitting an audible indication that an incoming call has been received.

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21. A method as claimed in claim 20, wherein the audible indication from the or each computer terminal is audibly differentiated from any other computer terminal.

10 22. A method as claimed in claim 21, wherein audible indication is given at a computer terminal not directly associated with the incoming call and the audible indication is one which is individual to the intended recipient of the incoming call.

15

23. A method according to any one of claims 14 to 22, including generating a screen pop at the screen of each terminal accessed in response to the receipt of an incoming call.

20

24. A method as claimed in any of claims 15 to 23, wherein each computer terminal can be independently programmed to provide audible indications of telephone numbers which are individual to that computer terminal.

25

25. A method according to any one of claims 14 to 24, wherein at least some of the computer terminals are

28

responsive to vocal commands.

26. A method according to any one of claims 14 to 25,
wherein at least one of the computer terminals is capable
5 of voice synthesis and is capable of providing call
identification in this manner.

FIG. 1

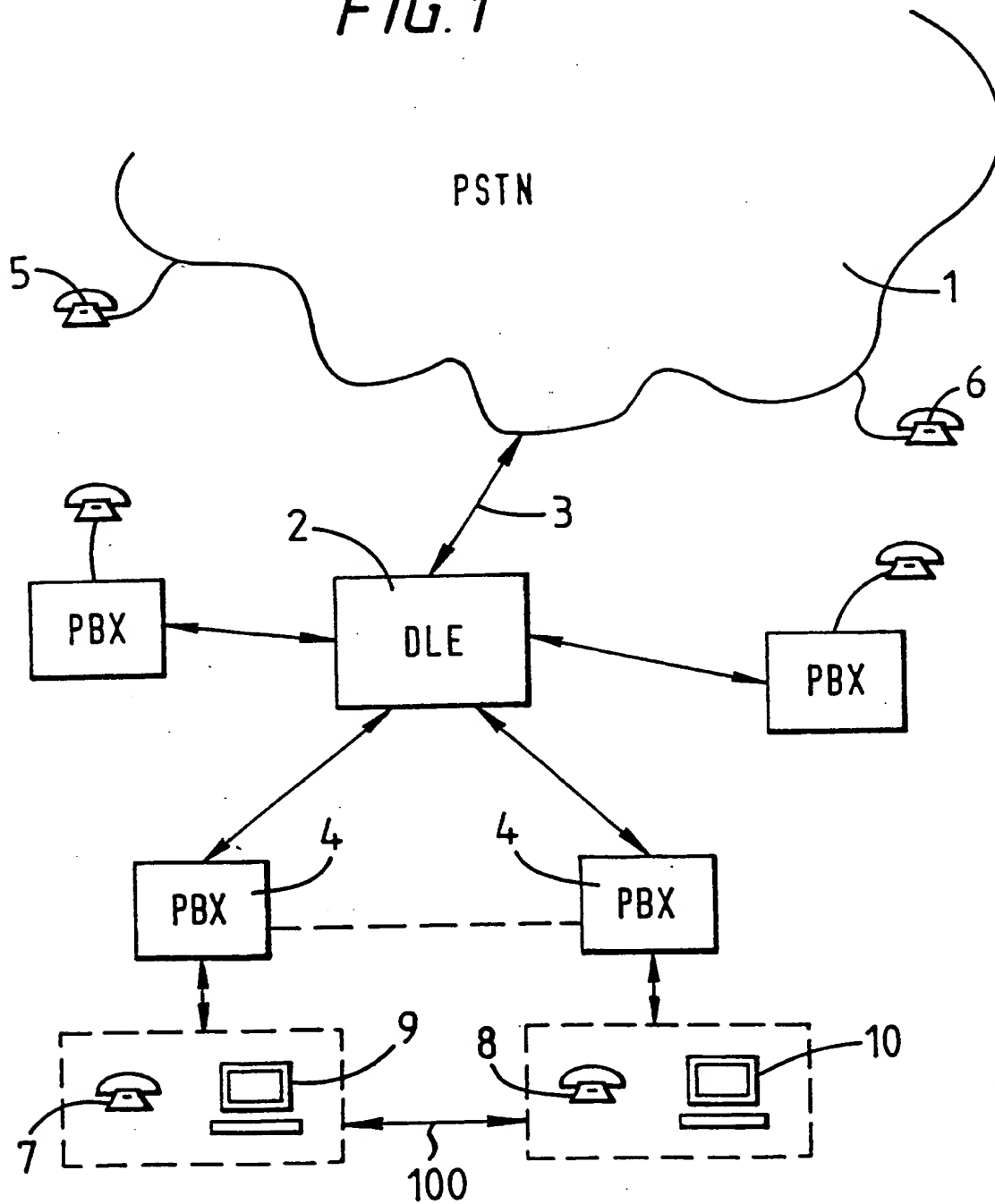


FIG. 2

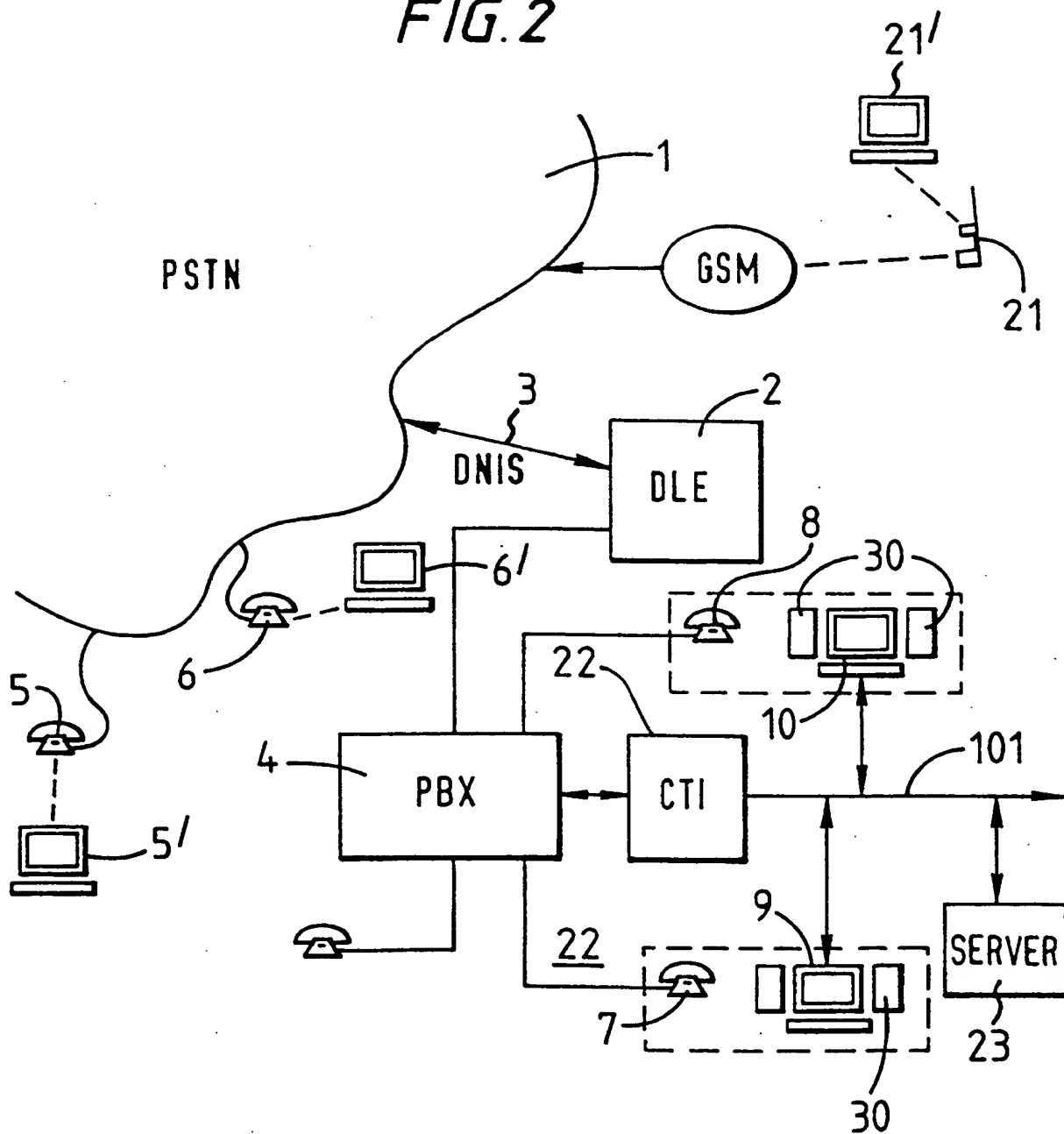
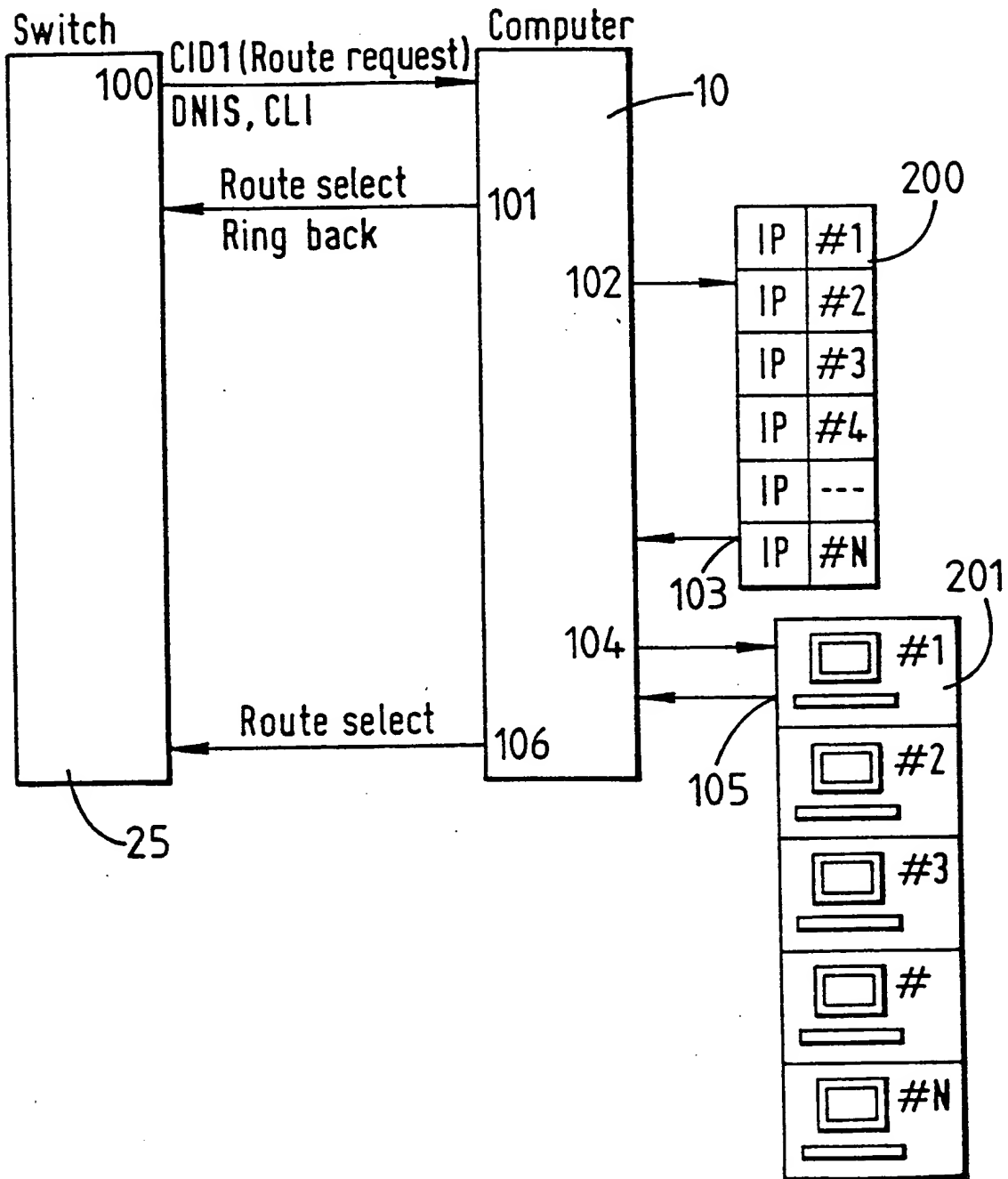


FIG. 3

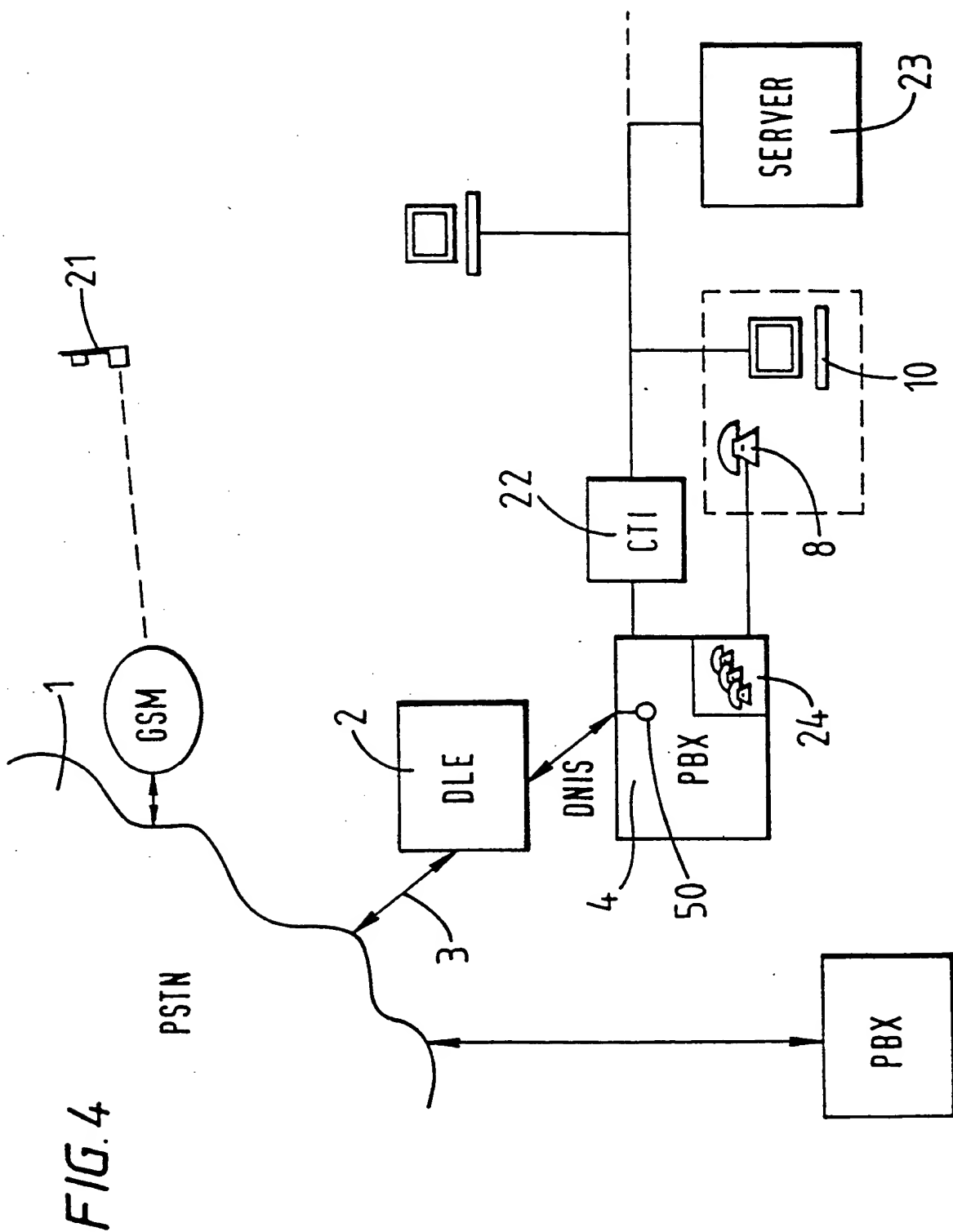


FIG. 5

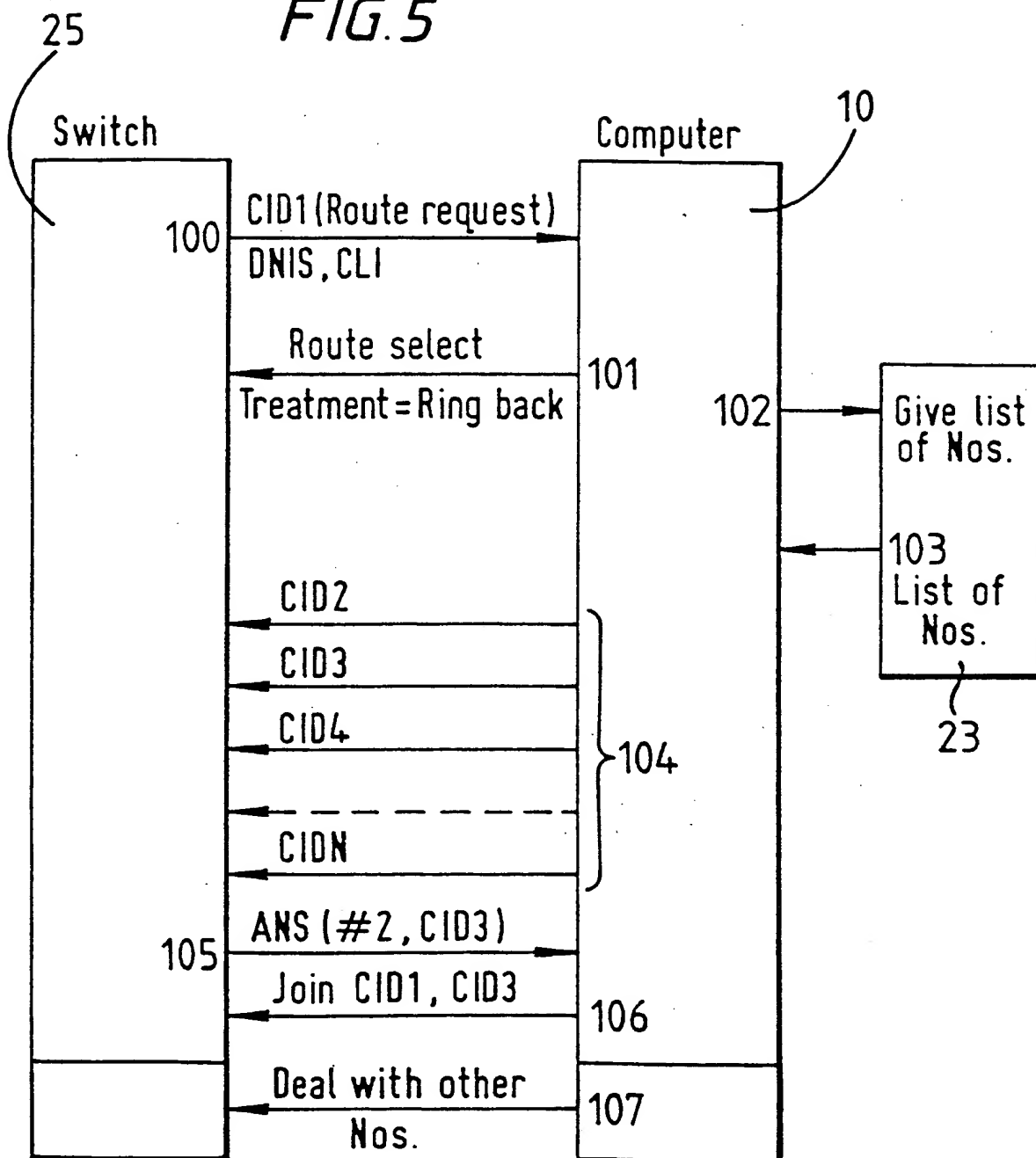
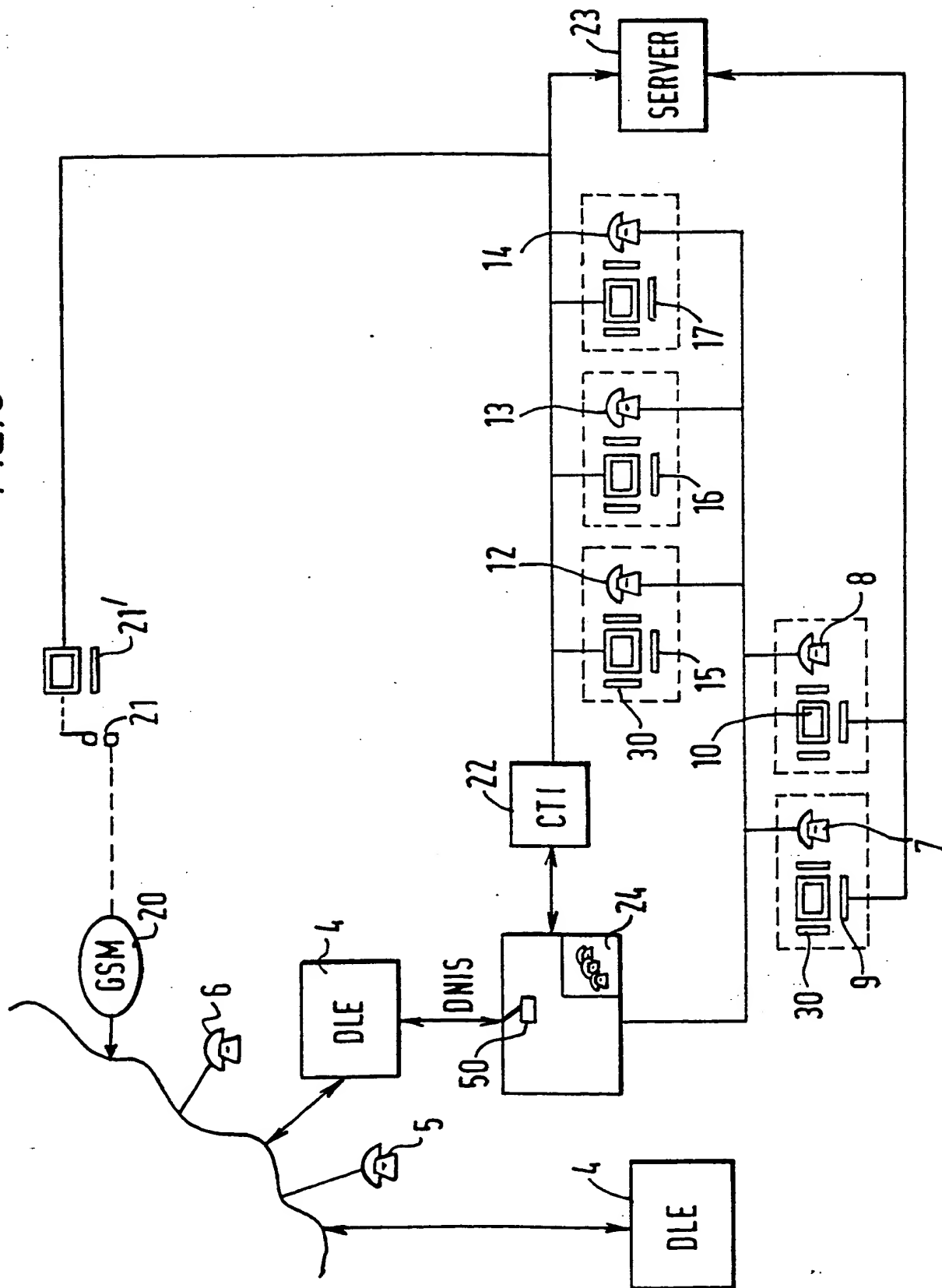


FIG. 6



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/01135

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04M3/42 H04M3/46 H04M3/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 549 126 A (AMERICAN TELEPHONE & TELEGRAPH) 30 June 1993 see abstract ---	1, 2, 14, 15
Y	GB 2 294 178 A (FUJITSU LTD) 17 April 1996 see page 7, line 18 - page 8, line 32 ---	1, 2, 14, 15
A	BOLTJES C J: "FACILITIES FOR USERS OF SOPHO-SET FEATURE PHONES" PHILIPS TELECOMMUNICATION REVIEW, vol. 48, no. 1, 1 March 1990, pages 20-27, XP000116333 see paragraph 8 --- -/--	1, 4, 14



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

17 June 1998

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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 866 758 A (HEINZELMANN KARL A) 12 September 1989 see column 2, line 14 - column 34 see column 5, line 28 - line 59 see abstract ---	1,3,5,14
A	JONAS REINIUS ET AL: "DIAVOX COURIER 700, DIGITAL SYSTEM TELEPHONE FOR MD 110" ERICSSON REVIEW., vol. 59, no. 2, 1982, STOCKHOLM SE, pages 58-66, XP002048531 see page 66, left-hand column, line 21 - line 42 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. l. Application No

PCT/GB 98/01135

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GB 2294178 A	17-04-96	JP 8111720 A	30-04-96
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